Horticulture

Automatic Database Partitioning in Shared-Nothing, Parallel OLTP Systems

Andrew Pavlo, Brown University
Carlo Curino, Yahoo! Research
Stanley Zdonik, Brown University

Objective

Provide NoSQL-like performance and scalability without giving up OldSQL ACID support by partitioning databases in a way that minimizes the number of distributed transactions and the amount of workload skew.

Motivation

Single-Partition Txn — Client → H-Store → Partition

No Locks, No 2PC, No Stalls

Distributed Txn — Client → H-Store → Partition

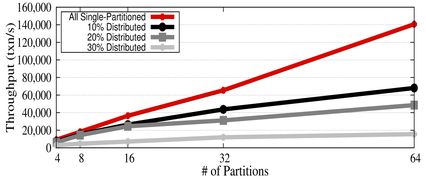
☹Locks, ☹2PC, ☹Stalls

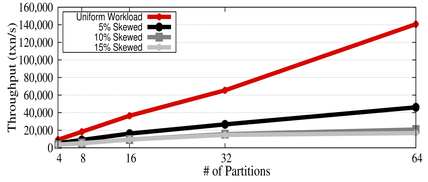
Balanced Workload — Client → H-Store Coordinator → Partition

↑Throughput, ↓Latency

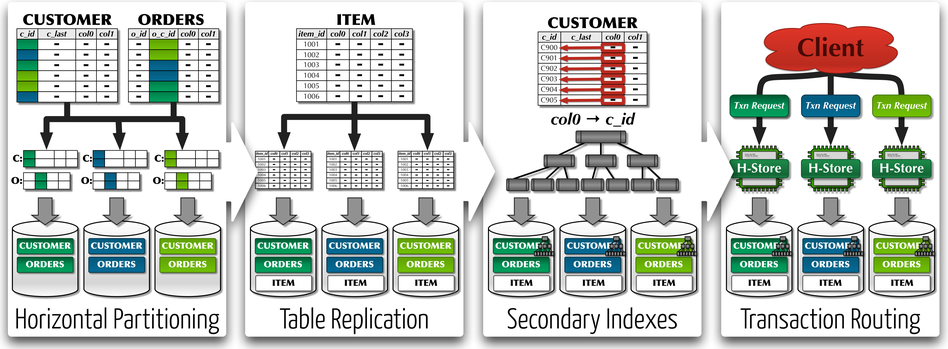
Skewed Workload — Client → H-Store Coordinator → Partition

☹Throughput, ☹Latency





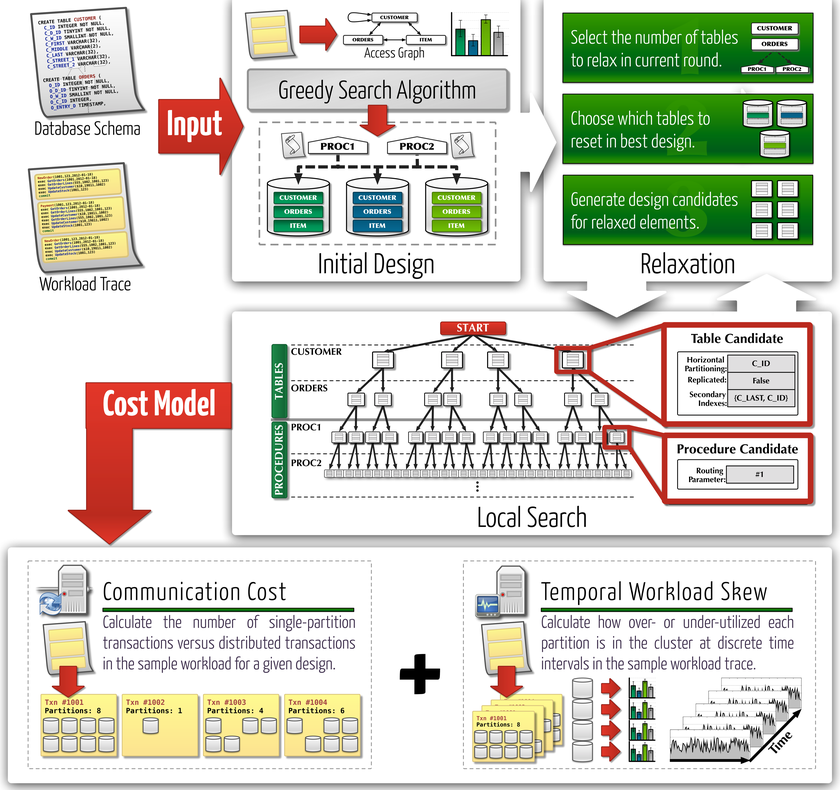
Parallel Database Design



Automatic Design Tool

Given a DDL and sample workload trace for an OLTP application, Horticulture automatically generates the optimal database design.

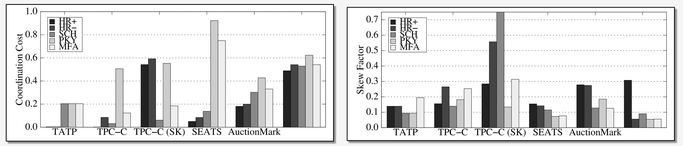
Large-Neighborhood Search Algorithm



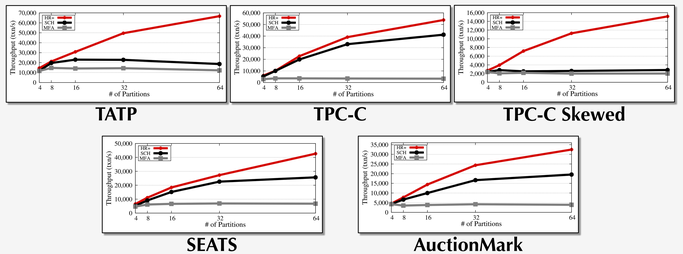
Experimental Evaluation

1 Algorithm Comparison using Cost Model

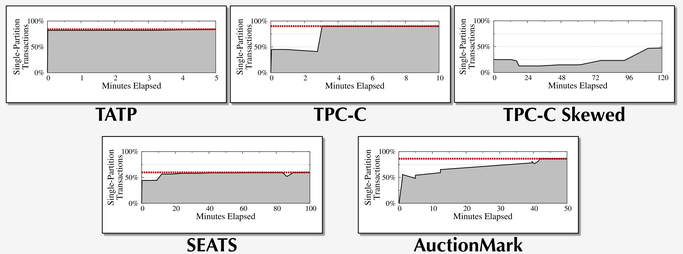
HR+: Large-Neighborhood Search
HR-: Initial Design Algorithm
SCH: Schism *(VLDB'10)*
PKY: Primary Key
MFA: Most Frequently Accessed



2 Transaction Throughput using H-Store



3 Elapsed Search Time



H-Store

BROWN Computer Science

"NoSQL Scalability, ACID Support, Mohan Friendly"